

INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 2003	Park: Shenandoah NP						
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Permit#: SHEN-2003-SCI-0008							
Park-assigned Study Id. #: SHEN-00284							
Project Title: Quantifying the role of pollinator mediated selection in the evolution of pollination syndromes in <i>Silene</i> (Caryophyllaceae)							
Permit Start Date: Mar 31, 2003	Permit Expiration Date Mar 31, 2006						
Study Start Date: Mar 31, 2003	Study End Date Mar 31, 2006						
Study Status: Suspended							
Activity Type: Research							
Subject/Discipline: Ecology (Aquatic, Marine, Terrestrial)							
Objectives: <p>The origins of pollination syndromes as reflecting pollinator mediated selection is one of the central paradigms related to the evolution of floral diversity. However, observations and recent models question the importance and commonness of pollination syndromes and reveal how little is known of the precise processes responsible for the evolution of floral traits that influence plant-pollinator interactions. The central focus of the proposal is to quantify the role of pollinator mediated selection in generating and maintaining the present suite of floral traits that differentiate three closely related species of <i>Silene</i>, <i>S. virginica</i>, <i>S. caroliniana</i>, and <i>S. stellata</i> (Caryophyllaceae). There is very high support from a molecular phylogeny that all three species are closely related to one another and either <i>S. caroliniana</i> or <i>S. stellata</i> are sister taxa to <i>S. virginica</i>. <i>Silene virginica</i>, or fire-pink, exhibits traits typical of the hummingbird pollination syndrome: bright red, pendant flowers which have no landing platform, no detectable nectar guides or floral odors and produce copious amounts of deeply held rich nectar. In contrast, <i>S. caroliniana</i> has narrow tubed, white-pink flowers corresponding to predicted moth pollination and <i>S. Stellata</i> has wide tubular white flowers suggesting pollination by a combination of moths and bees. Consequently, a major theme of this proposal is to determine whether patterns of selection on floral characters match the predicted role of the important pollinators as the primary selective agents in the floral evolution of the three closely related <i>Silene</i> species. Because our questions are within a phylogenetic context we can define the relevant character states and transitions that contribute to the origin and/or maintenance of potential pollination syndromes in the three <i>Silene</i> species.</p> <p>To quantify pollinator importance for each of the three <i>Silene</i> species, we propose detailed pollinator observations that incorporate measures of visitation frequency and efficient pollen transport. We also propose to study the level of discrimination among the pollinators for each of the <i>Silene</i> species by quantifying pollinator visitation in a mixed species array. The efficiency of pollen transport may be more important than discrimination in determining which pollinators are the major selective agents of floral design for our study species. Thus, we also propose to measure efficiency or inefficiency of inappropriate important pollinators on the different <i>Silene</i> species(e.g., the important pollinator of <i>S. virginica</i>, likely hummingbirds, on <i>S. caroliniana</i>). We will conduct single and multi-trait floral phenotypic manipulation for each of the three <i>Silene</i> species. By conducting multi-trait manipulations we can also examine the contribution of interactions among floral traits and future survivorship and reproduction which may give rise to</p>							

apparent stabilizing selection on floral traits, or stasis of floral traits when pollinators are exerting directional selection on these traits. Our studies will be conducted across years to place our experiments and observations in the appropriate ecological context incorporating temporal variation. Thus we hope to provide a deeper understanding of the validity of the pollination syndrome concept as well as the selective processes responsible for the origin and maintenance of floral traits in the three divergent, yet closely related species of *Silene*.

For the purposes of this permit we will only study *S. caoliniana* populations that are naturally occurring in the park. We plan to quantify pollinator importance by natural pollinator observations and by caging 30 plants where 10 are available to pollinators during the day, 10 plants are available to pollinators only at night and 10 plants are caged both day and night.

Findings and Status:

"No activity was conducted this report year"

For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?

No

Funding provided this reporting year by NPS:

0

Funding provided this reporting year by other sources:

0

Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college**Full name of college or university:**

n/a

Annual funding provided by NPS to university or college this reporting year:

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